REMARKS

Claims 1-20 are pending in the present application. The rejections under 35

U.S.C. 103 are respectfully traversed. However, in order to further the prosecution of

this application, independent claims 1, 7, 10, 14, 15, 17 and 20 have been amended in

order to further distinguish them from the cited art. Support for the claim amendments

can be found in the specification and drawings, in particular, in Figures 4 & 5 and in

paragraphs 0021-0022, 0034-0069 and 0090 of US2004/0165655 (published version of

the present application). No new matter has been added. Applicants believe that the

present application as amended is now in condition for allowance of which prompt and

favorable action is respectfully requested.

<u>35 U.S. C. 103 Rejection</u>

Claims 1-20 were rejected under 35 U.S.C. 103(a) as being unpatentable over

Sourour (US 6,865,218) in view of the present application's disclosed prior art

(specifically figures 2 and 3). The MPEP recited the standard to be applied in an issue of

obviousness under 35 USC 103. Section 2143.03 of the MPEP states in part:

ALL CLAIM LIMITATIONS MUST BE CONSIDERED

"All words in a claim must be considered in judging the patentability of
that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165
USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious
under **35 U.S.C. 103**, then any claim depending therefrom is nonobvious.
In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

And, to establish a *prima facie* case of obviousness, the prior art
references "must teach or suggest all the claim limitations." M.P.E.P.§
2142.

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The independent claims have been amended to recite the element of "the first modulated signal is from a first transmit antenna from the plurality of antennas" and "the second modulated signal is from a second transmit antenna from the plurality of antennas" or "each of the plurality of modulated signal is from a different transmit antenna from the plurality of antennas."

The pending claims, as disclosed in the present application, are directed towards a time tracking method for signals generated at a base station which uses transmit diversity, that is, using more than one transmit antenna. This feature is explicitly recited in the pending claims. The present application discloses a solution for time tracking using transmit diversity as illustrated in Figure 4 for a Space Time Spreading situation and in Figure 5 for an Orthogonal Transmit Diversity situation. As stated in the present Application:

> "The present invention encompasses a method for offset time tracking in a non-negligible multipath spacing environment in which an antenna diversity system is operating. The antenna diversity system comprises a plurality of antennas that each transmits a signal to a mobile station...The time tracking is accomplished by generating updated time offsets in response to an average time error signal or by allowing the demodulating elements to independently time track the signals from each antenna. The embodiment used depends on whether the diversity antennas are transmitting using Space Time Spreading or Orthogonal Transmit Diversity." *US2004/0165655, paragraphs 0021-0022. Emphasis added.*

Furthermore, each transmit antenna uses a distinct spreading sequence. This feature is also explicitly recited in the pending claims with each independent claim 1, 7, 10, 14, 15, 17 and 20 reciting the claim element of "the second data despreading sequence is different from the first data despreading sequence" or "the data despreading

sequence is different for each of the plurality of modulated signals." Specification

support is found in paragraphs 0034 and 0052 which state:

> "While the transmitted signals are substantially similar, they are different in that <u>different spreading sequences are used</u> on the data during the modulation process in order to keep the signals from interfering with each other during transmission." *US2004/0165655, paragraph 0034. Emphasis added.*

> "In the above-described embodiment, <u>$c_{d1}(n)$ and $c_{d2}(n)$ are different data despreading sequences</u>. Since the base station had to cover the data with <u>different sequences</u> prior to transmission in order to keep the signals from interfering, the fingers of the receiver have to use these different sequences in order to decode the data." *US2004/0165655, paragraph 0052. Emphasis added.*

As recited, the pending claims offer a novel and prescriptive solution to the

problem of signal time tracking in the receiver when multipath interference occurs with

transmit diversity; that is, each modulated signal received and used for time tracking is

from a different transmit antenna.

In contrast, the cited prior reference, Sourour, discloses an interference reduction

method where the interference is due to multipath signals in a CDMA receiver. It

describes a modified RAKE receiver with several interference estimators which subtract

interference estimates from the RAKE fingers. Details of this approach are illustrated in

Fig. 7 of Sourour for an example of three RAKE fingers. Sourour states that if there are

L fingers, there should be (L-1) interference estimators per finger for a total of L(L-1)

interference estimators.

However, Sourour fails to address one key issue addressed by the pending claims,

that is, time tracking of modulated signals generated from a base station which uses

transmit diversity wherein each modulated signal is transmitted from a different transmit

antenna. In fact, Sourour clearly assumes a <u>single transmit antenna</u> as shown in Fig. 1 and Fig. 6 with one transmit antenna and multipath replicas of the originated modulated signal from the one transmit antenna. Sourour offers no motivation given towards obtaining a time tracking estimate with more than one transmit antenna sources, as recited in the pending claims.

Moreover, in Sourour, the process of time tracking is mentioned only peripherally in connection with Fig. 4 as follows:

> "The propagation path delay information determined by the searcher 182 is provided to the delay tracker 183, which further refines the delay estimates {τ} such that the PN code sequence used by the RAKE receiver 200 may be synchronized with the propagation paths of interest. The delay tracker 183 also includes tracking hardware that allows the mobile terminal to keep its RAKE receiver 200 aligned with the propagation paths' potentially changing path delays..." *Sourour (US 6,865,218), Col. 7, lines 15-24.*

Thus, no specific time tracking algorithm is offered by Sourour where the time offset estimate is obtained by a weighted average from more than one received signals arising from more than one transmit antennas.

Additionally, in contrast to the recited claim elements, Sourour '218, discloses a multipath interference reduction system which uses the <u>same</u> PN offsets (i.e., the <u>same</u> data spreading sequences, and hence, the <u>same</u> data despreading sequences) with different time delays. In particular, Sourour does not disclose the recited claim elements, that is, using different spreading or despreading (e.g. PN) sequences to avoid interference from <u>multiple transmit antennas</u> used for transmit diversity. Using different data despreading sequences for each signal is one of the features of the pending claims.

> "In operation the primary RAKE 202 is configured such that each one of the primary RAKE fingers 210 is assigned to one of the propagation paths

of interest. Each primary RAKE finger 210 correlates <u>the received CDMA signal at a time offset corresponding to a path delay</u> associated with the assigned propagation path of that primary RAKE finger 210. Each primary RAKE finger 210 may be time-aligned in a number of ways. For example, the primary RAKE fingers 210 might share delay elements (not shown) such that the received CDMA signal r(t) could be appropriately delayed or time offset by values corresponding to the various propagation path delays of interest, and then these time adjusted versions of the received CDMA signal r(t) could be provided to the corresponding primary RAKE fingers 210. Alternatively, <u>the PN code and Walsh code sequences supplied to each of the primary RAKE fingers 210 and used in their correlation operations can be offset by an amount corresponding to the propagation path delay associated with the particular primary RAKE finger 210. Offsetting the PN code and Walsh code sequences in this manner is often times referred to as 'code phase offsetting.'</u> By offsetting the PN code and Walsh code sequences, it may be more practical to include delay elements within each of the primary RAKE fingers 210." *Sourour (US 6,865,218), Col. 8:50 through Col 9:6. Emphasis added.*

"Thus, the correlator can use the appropriate one in the set of path delay values {τ} <u>to offset the PN code sequence</u> and Walsh code by an amount related to the path delay of the corresponding propagation path." *Sourour (US 6,865,218), Col. 9:65 through Col. 10:1. Emphasis added.*

The cited secondary reference (i.e., the present application's disclosed prior art) does not make up for this deficiency since it too does not disclose the claim element of using different data despreading sequences to demodulate each modulated signal or wherein each modulated signal received is from a different transmit antenna.

CONCLUSION

In view of the remarks made above that Sourour and the secondary reference do not disclose the claim elements of each modulated signal being from a different transmit antenna and using different data despreading sequences to demodulate each modulated signal as recited in independent claims 1, 7, 10, 14, 15, 17 and 20, either separately or in combination, a prima facie case of obviousness is not supported.

With respect to the dependent claims, which respectively depend from the independent claims addressed above, these dependent claims are believed to be allowable based on their dependencies, as well as on their merits. Thus, the cited references, either taken separately or in combination, do not disclose, teach or suggest all of the features of pending claims and the 35 USC 103 rejection should be withdrawn accordingly.

Request For Allowance

In view of the foregoing, Applicants submit that all pending claims in the application are patentable. Accordingly, reconsideration and allowance of this application are earnestly solicited. The Commissioner is authorized to charge Deposit Account No. 17-0026 for the fees owed for the Request for Continued Examination (RCE). Applicants do not believe that any other fees are due regarding this amendment. However, if any fees are required, please charge Deposit Account No. 17-0026. Applicants encourage the Examiner to telephone the Applicants' attorney should any issues remain.

Respectfully submitted,

Dated: July 30, 2009   By: /Kenyon S. Jenckes/

                                            Kenyon Jenckes, Reg. No. 41,873

QUALCOMM Incorporated
Attn: Patent Department
5775 Morehouse Drive
San Diego, California 92121-1714
Telephone: (858) 651-2426
Facsimile: (858) 658-2502